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must be able to employ a variety of the learning strategies measured by the LASSI. For example, students must be willing and motivated to work hard, and they must monitor their strategies for effectiveness. Many students recognized that the scales influenced each other. Students could be charged with designing a plan for changes at this critical moment of awareness to increase chances of transferring study strategies.

Scales Influencing Other Scales

Students were very aware of their level of anxiety and learned specific strategies to focus efforts to reduce this anxiety. For example, positive self-talk and attitude can influence anxiety. Students recognized the ability to change their attitude, learned the strategy to change it, employed the strategy, and then reflected on the successful implementation of that strategy.

- "The first time my results forced me to acknowledge what my weaknesses were. This time around, I am happy to see improvement and I'm motivated to continue working on the things that still have room for improvement," and
- "Self-testing and motivation really go hand and hand because I don't have the motivation to test myself."

Self-testing and comparison of programs might be applied to content as well as study strategies to augment success.

Program Influence

Many participants attributed changes in scale scores to the design of the program. In particular, the rigid schedule as well as the required elements imposed structure on participants' study and learning habits. Some comments by participants that support this claim include

- "This class helps students in all areas by guiding us w/ lots of structure,"
- "I think the program was overwhelming at first then the opportunities presented alieviated [sic] a lot of the stress,"
- "Use of support materials mandatory," and
- "Improved attitude and motivation due to positive manner of course & instructor support feeling I can succeed and learn math."

This finding adds support to the importance of highly structured learning environments for developmental students.

Future Use of Study Skills Learned in Class

Over 50% of the students commented on how the learning strategies in this course will help them in future courses. Many students discussed how they plan to use these valuable tools in future studies and course work. Whether students were able to manage stress and anxiety in more effective ways or able to apply study techniques to focus on big ideas versus details, they commented on their awareness, willingness, and abilities to use these strategies in new situations. The finding that students were not always aware of their new strategy use could be problematic in terms of continuing to use new strategies. Instructors and staff could request feedback from students regarding all their "activities" and point out any that might be an unrecognized study strategy.

Other Points of Interest

Statistical significance was achieved in every scale, reflecting the effectiveness of the program. Information processing was the scale that resulted in the lowest overall pre/post change. Perhaps one of the reasons that information processing realized the lowest positive change may be due to participants' lack of previous content knowledge and thus inability to make the necessary connections. Also, the organizational strategies were concurrently addressed along with content knowledge acquisition, and this may have blurred the delineation from the participants' perspective as to what the change agent actually was.

Many participants attributed changes in scale scores to the design of the program.

Of the scales with the highest number of participants with positive change—concentration, test strategies, and time management—only time management coincided with self-testing as scales yielding the highest average positive change. Time management, also the scale with the largest overall change, may have surfaced to the top primarily because of the imposed structure of the program. Highly structured programs can reinforce appropriate time-management behaviors.

Limitations

There are two limitations that are program specific. First, note that eligibility requirements were established and students were required to apply. Not all students who applied were accepted into the program. Thus, students were not randomly chosen and an element of competition may have affected their motivation. Another limitation was that the instructors were chosen by the project director particularly because of their effective teaching techniques.

There are additional limitations regarding the methods of this study. First, changes in study strategies are based on self-report measures. Using additional measures to support the data collected from the self-report measures would strengthen the study. Second, an experimental design with randomization and a control group of students who did not receive study skills instruction would extend this study to focus not only on acquiring the skills but also on how study-skills instruction impacts the learning of mathematics.

Recommendations and Suggestions

Through this research, it was found that there is a void in studies that hone in on the specific needs of developmental mathematics students, especially as they relate to the effectiveness of study strategies. A natural extension to the current study is to consider tracking students to ascertain (a) the transfer of knowledge and skills of both mathematics and study strategies to future mathematics classes and (b) graduation success. Although this study found that students self-reported changes in study skills, future studies should consider other measures for reporting changes in study skills and consider using a control group to pin point how study skills directly impact students' learning. Furthermore, a distinction between study strategies and learning strategies through either supplemental efforts or embedded in courses may help fine-tune results achieved in this study.

One of the primary suggestions resulting from this study is to provide structure for students. The structure in this course led to the strong sense of community the students built. For example, since the students were together most of the day, they were able to make strong connections because they had time to build trust and relationships on common ground. Another suggestion for program implementation is to utilize various methods of infusing study and learning strategies. These methods include incorporating the strategies into lesson plans and providing supplemental methods. These methods should tie in mathematical content whenever possible.

Conclusion

Overall, the program proved to be successful in regards to study and learning strategies as reported on the LASSI by participants. In particular, this research study highlighted positive impact on the strategies utilized by developmental mathematics students through study

strategy incorporation in both a developmental mathematics and college algebra class. As study skills improve, so should pass rates. Success in developmental mathematics—a proclaimed "gatekeeper course"—will assist underprepared students' overall success and college graduation.

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